

Study on the Dynamics of Financial and Economic Correlation Network of Banks in Implementing Digital Transformation with Precise Policies

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Abstract: In recent years, with the rise of digital transformation wave, China's economy is changing from traditional factor driven to innovation driven, especially in the financial field. Today's rapid development of digital information technology has provided unprecedented impacts and severe challenges for our country's commercial investment banks. How to actively respond to these impacts and successfully implement their digital transformation has become a major issue that our country's commercial investment banks must face. The purpose of this article is to analyze the role of digital transformation on the dynamics of the network in the banking financial econoour and expound the great significance of the digital transformation of our country's financial econoour from various aspects. It shows the importance of the digital transformation of our country's financial econoour. The article mainly introduces the concept of digitalization, explains the necessity of digital transformation of banks, and expounds the relationship between the structure of the banking industry and economic development. At the same time, it combines the operation status of commercial banks in this city, the current status of commercial bank electronic financial services and the development status and trends of commercial bank electronic financial services. It analyzes the difficulties of commercial banks in the transformation of Internet financial service models. Among them, it was found that the highest utilization rate of inter-bank transfer business was 46%, followed by intra-bank transfer at 29.1%, and online banking and internet transfer accounted for less than 1%. Moreover, traditional electronic banking functions were lacking and could no longer meet the needs of customers. Therefore, commercial banks must carry out digital transformation and gradually enter Digital Bank 4.0 to improve services by using emerging digital advanced technologies.

1. Introduction

Digital transformation is a high-level transformation based on digital transformation and digital upgrading, which further touches the company's core business and aims to create a new business

model. With the development of information technology and Internet technology, digitization has become an inevitable fact in our lives. Applications such as Alipay, We Chat, government websites, Wei bo and mobile customers have taken an important step in providing quality services to the public. The number of government Internet service users reached 318 million, accounting for 40.2% of the total number of Internet users. Internet government services have brought great convenience to the public and improved people's happiness. At the same time, digitalization has brought about changes and has shaken many industries, including traditional banking. With the development of technology, China's banking industry is also adapting to new changes in order to meet the in-depth needs of customers. We can no longer rely on the growth and diffusion of physical assets between banks and creditors to develop the banking industry as we did before. We need to use more technology to better understand customer needs and develop products that meet customer needs. Therefore, the business and practice of commercial banks have undergone major changes, and they are in a period of transition to digital banks.

With the advent of the digital information era, it has had a significant impact on all areas of our daily lives, and people's needs for daily life are also increasing. The research in this article focuses on the impact of digital technology on our country's large and medium-sized commercial banks, and points out that our country's commercial banks must transform their own work models on the basis of digitalization. It is of great significance to study the necessity of our country's commercial banks to transform to digital banks and the planning of the transformation path. In today's digital age, it points out the right direction for the development and transformation of our country's commercial banks. The purpose of this paper is to dynamically analyze the relevant networks of banking finance and economy based on the precise policy implementation of digital transformation development, with a view to making certain contributions to the digital transformation of banking finance.

Combined with the research progress at home and abroad, different scholars have done some research on the issue of digital impact in the banking industry: Mayovets Y Y pointed out in the article that despite all the advantages of digital transformation, the banking industry is one of the first to face financial fraud through online communication channels (Viber, Whats App, etc.). When consumers are attacked in a radical way, they ask for personal bank card information. Such risks need to receive feedback from customers in order to solve the problem of personal data leakage in a timely manner and block the customer's card when necessary [1]. In this article, Kurmanova DA studied the formation of the digital ecosystem in classic commercial banks by organizing the interaction between the front and back ends of the bank on the basis of a single technology platform designed to support the bank's business process management process [2]. Zamaslo O has studied the methods of evaluating bank digitization affected by economic digitization, dynamic electronic payment, e-commerce, and innovative digital service technologies. Digital banking services, a wide range of online platforms and digital customer communication channels require a method to evaluate the digitalization of banks and strategically identify the competitiveness, strengths and weaknesses of banks. The goal is to develop the bank's digital indicator system and evaluation method within a complex indicator range [3]. The goal of Meena M's research is to analyze whether the bank's weather digital transformation will increase or decrease bank employment opportunities among bank employees [4]. Aydin S research explores the impact of digital transformation and continuous changes in the banking industry on customer experience and customer attitudes (such as loyalty, satisfaction, and recommendation). The results show that in terms of digital applications, banks need to pay attention to practicality and ease of use in order to be competitive in the market [5]. Shkodina I, based on the analysis of the trends and threats of digital transformation in the global banking industry, concluded that there is an imbalance in the digitalization of the banking industry in different regions [6]. Kolodiziev O examined the competitiveness of Ukrainian banks affected by

economic digitization, the dynamic spread of electronic payments and e-commerce, and innovative technologies aimed at providing digital services. When a bank transforms to an online platform business model, it can expand the range of bank products and attract more customers, thereby forming a competition policy and gaining a competitive advantage [7]. The purpose of Barjaktarovi L's research is to determine whether there is a connection among the funds invested in digitalization and the results achieved by the bank through relevant financial indicators. The research results show that the banking business of the alternative distribution channel products of the Republic of Serbia (RS) is in line with the world trend and can be considered mature [8]. However, these studies only one-sided analysis of the relationship between digitalization and banks, and did not fully analyze the importance of bank digitalization.

The innovation points of this paper are: (1) Discussed the importance of digital transformation of banks and the necessity of digital transformation; (2) Based on the experimental analysis of the dynamics of banking finance and economic related networks based on the development of digital transformation, it is believed that they can no longer meet the needs of customers. From this, we can see the importance of digital transformation for the banking industry.

2. Dynamic Analysis Method of the Development of Digital Transformation on the Banking Financial and Economic Correlation Network

2.1 Digitization

Digitization is a breakthrough in the development of information technology, and it has a huge power to promote the development of the digital econoour. With the rapid development of a new generation of digital technology, all levels of society are using digital technology to create more and more value, accelerating the digital transformation of all levels [9]. Digitization refers to the use of digital information processing technology in all aspects of a certain field or in all aspects of a certain product.

In essence, the sampling theorem lays an important foundation for digital technology. That is, under certain conditions, a discrete sequence can completely represent a continuous function. The digital information technology revolution promotes and promotes the transformation of human beings to digitalization. Figure 1 shows the impact of digital transformation. With the development and progress of modern science and technology, human society is booming, and agriculture and science and technology will also usher in the first year of socialist econoour with Chinese characteristics. The Industrial revolution brought a major evolution from an agricultural econoour to an industrial econoour in our country [10]. Today, the revolution of digital information technology urges us to transform to the digital mode of human production and residents' daily life on a global scale, creating a global economic mode-digital econoour. Digitization has also been the leading driving force for the development of digital econoour [11].

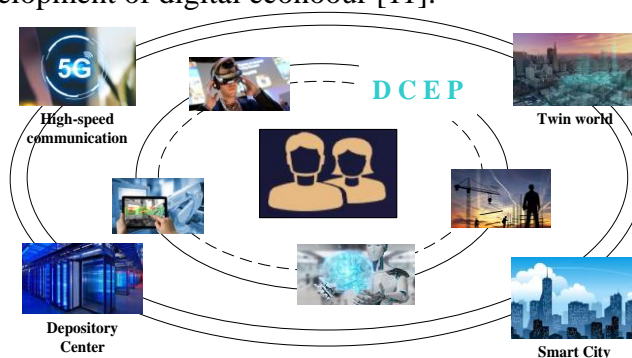


Figure 1: Digital change

The cost reduction of digital technology gives full play to the value of digital. Since the invention of computers, various digital technologies such as the Internet of Things, cloud computing, and artificial intelligence have continuously emerged, and their costs have been continuously reduced. This has enabled digital technology to move from science to practice, forming a complete digital value chain, deploying in all walks of life, and promoting digitalization. At the same time, it continues to create new value for many industries [12].

The rapid development of digital infrastructure has promoted more extensive and in-depth digital applications. The government and all walks of life accelerate the construction of digital infrastructure in an all-round way, and promote the integrated innovation and integrated application of industrial Internet, artificial intelligence, Internet of Things, Internet of Vehicles, big data, cloud computing, block chain and other technologies. Make digital applications more widely infiltrate all levels of social and economic operations, and become the core driving force for the development of digital economy [13].

Compared with traditional information, digitization is produced and developed on the basis of the rapid development of information. However, unlike the traditional segmented service business approach, digitization is more of a systematic transformation and reconstruction of business and business models [14].

Digitization has opened up corporate information islands and unlocked the value of data. IT is to make full use of information systems to handle business processes such as production processes, transaction processing, cash flow, customer interaction, and generate data, information, and related knowledge and support to improve business performance. It is like a subdivided chimney application, while digitization is the use of a new generation of ICT technology to collect real-time business data. Cooperate with smart grid applications to open up business data islands, realize the free flow of business system data, and make full use of data [15].

Digitization has changed the production relations of enterprises and increased their productivity. Digitization enables companies to shift from traditional manufacturing practices to data function, and from traditional division of labor to collaborative methods [16-17]. The advantages of digital technology are: strong anti-interference ability and high precision; The digital signal is convenient for long-term storage, so that a large number of valuable information resources can be preserved; Good confidentiality and versatility. Comprehensively understand each energy industry, make correct timing decisions, effectively allocate business resources, adapt to the ever-changing market economy, and maximize economic benefits [18-19].

2.2 Necessity of Bank Digital Transformation

The banking industry is currently experiencing a special era towards full digitization. As shown in Figure 2, digital information is clinging to all aspects of our lives. With the rise of technology and financial technology and the breaking of barriers, a lot of knowledge and information technology are subverting the original business of banks. The digital transformation of banks can build bank outlets into customer experience centers, and provide services such as customer perception, user experience, precision marketing, and product sales by using AI, big data and other technologies. Traditional banks did not focus on product innovation and customer awareness. Banks' demand for digital transformation is prominently reflected in three aspects: changes in customer behavior preferences, channel and product innovation, and internal and external competition [20].

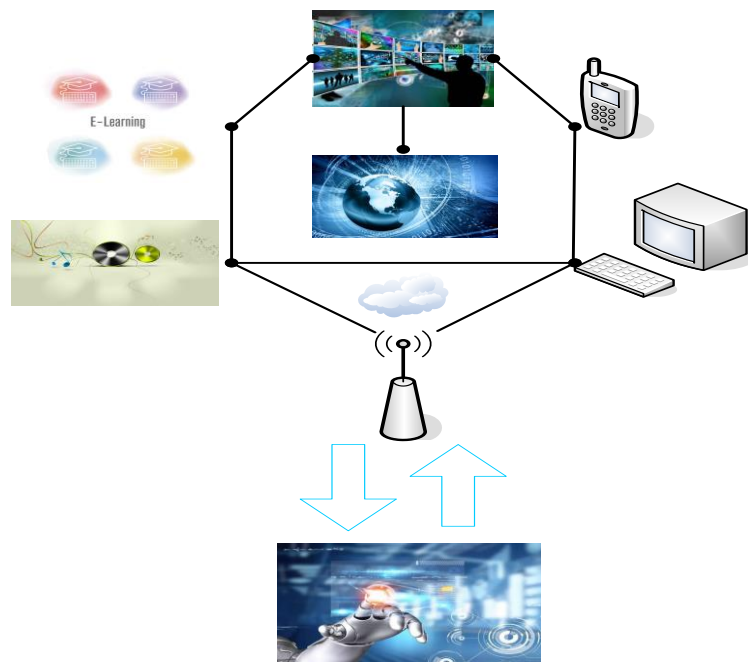


Figure 2: Digital information

The preferences and behaviors of customers are undergoing great changes, so creating a good customer experience is imperative. The infiltration of mobile Internet and other financial technologies has significantly changed the financial behavior and investment preferences of our customers. The starting point of digital transformation is strategic transformation for banks, which sets new development direction through strategy, unifies the overall cognition of enterprises through strategy, and then forms unified behavior. In the banking industry, there are universal financial products and traditional marketing methods with different homogeneity, which can no longer satisfy customers' increasingly flexible, personalized, offline, and diversified financial services. Especially for some new customers with obvious network characteristics, only by further deepening our network needs and meeting the individual needs of these new customers can we win the future market. Research also shows that creating a good customer experience can increase sales by 40% to 60%. Through comprehensive digital transformation, it is an inevitable choice for the banking industry to accurately manage customer groups and enhance customer experience [21].

With the diversification of channels and products, creating financial innovation has become the only way. Traditional financial institutions use offline channels as the main place for marketing and services. With the advent of financial technology, channels such as telephone banking, e-banking, and We Chat banking continue to emerge. Statistics show that in 2018, mobile banking surpassed offline stores and became the most effective communication channel with customers, with users accounting for 61%. Establishing digital channels is an important opportunity for banks to overcome network restrictions. On the other hand, digital transformation can effectively promote bank product innovation. Thanks to the continuous advancement of data collected by consumer online and big data technology, banks have broad development prospects in the fields of investment and real-time loans, and they have network interfaces. Currently, the bank is actively using digitalization, product development and service flow transformation. First, use big data, artificial intelligence and other technologies to improve user experience. Second, strengthen user experience and data analysis, fully tap the value of user data, promote user behavior analysis, and form an online and offline integrated platform; Third, with the help of machine learning, artificial intelligence and other technologies, we can achieve personalized user portrait push mode, reduce

the cost of information acquisition, and improve the efficiency of customer acquisition. To cope with the strategic inertia of digital transformation of banks.

Under the pressure of internal and external competition, deep licensing of big data has become an inevitable choice. At present, economic growth has generally slowed down, and competition in the banking industry has become increasingly fierce. At the same time, external financial technology companies have obtained industry tickets, and the banking industry urgently needs to use data authorization to enhance competitiveness. In the industry, large state-owned banks use their price and technological advantages to squeeze the businesses of small and medium-sized banks in a way that they are "submerged" in their business layout. In addition to the industry, financial technology companies rely on their industry background, Internet channels and Internet ecological resource advantages to occupy a large market share in payment companies, inclusive finance and other fields. Private bank based on Internet companies and powerful technology companies have new competitive advantages and business dynamics. In the face of this "internal and external troubles" situation, it is an inevitable choice for the banking industry to formulate a digital transformation strategy as soon as possible. Figure 3 shows the development history of banking technology [22].

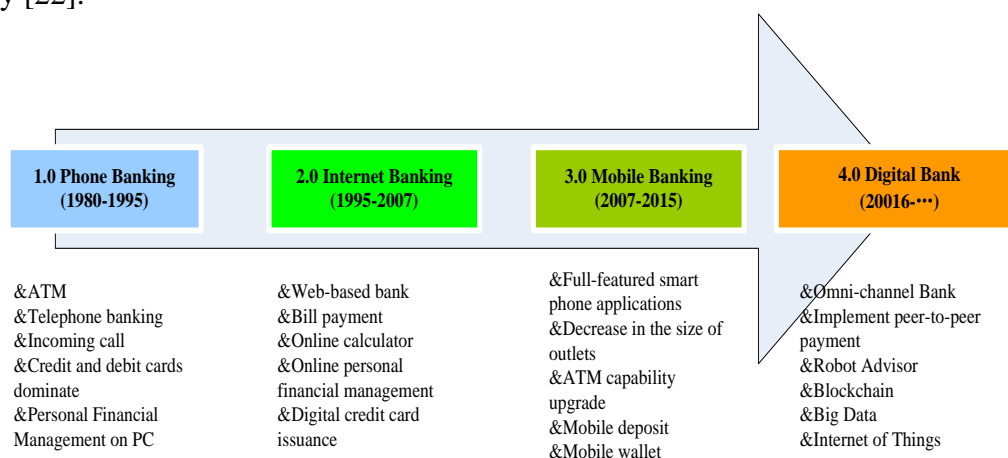


Figure 3: Development of bank technology

2.3 Methods on the Relationship between Banking Structure and Economic Development

In order to explore the relationship between the structure of the banking industry and economic growth, and considering that banks mainly act on the economic structure through loans, they have an effect on the econoour. Therefore, the proportion of total bank loans in total loans of all financial institutions (CR4) is selected as a measure of banking market concentration to reflect the variables of bank market structure. In order to eliminate variance, select local GDP and take the logarithm as LGDP to reflect the variable of economic growth.

According to the existing theoretical foundation, the research method of the relationship between banking structure and economic development adopts Granger causality test on the two variables LGDP and CR4. The premise of this test is the stability of the unit root test variables and the long-term equilibrium relationship between the variables. Therefore, ADF test, Co-integration test, correlation analysis can be performed one by one, and then Granger causality test can be performed [23].

(1) ADF inspection

Stability is the premise of time series data analysis. The extended Dickey-fuller test (ADF test) can be used to test whether the time series is a stationary time series. The ADF test equation is as

follows:

$$\Delta T_n = a + b_n + (c - 1)T_{n-1} + \sum_{i=1}^m b_i \Delta T_{n-1} + d_n \quad (1)$$

Among them, a , b_n , c , b_i are parameters, d_n is a random error term, which is a white noise process subject to independent and identical distribution. The original hypothesis F_0 is $c=1$, that is, T_n has a unit root, that is, it is non-stationary, and n is the trend factor [24].

(2) Co-integration analysis

If the sequence $T_{1n}, T_{2n}, \dots, T_{kn}$ are all single integers of order f , there is a vector

$$\vec{a} = \begin{pmatrix} a_1 \\ a_2 \\ \dots \\ a_k \end{pmatrix} \quad (2)$$

Make

$$z_n = a t_n' \sim I(f - p) \quad (3)$$

In

$$t_n = (t_{1n}, t_{2n}, \dots, t_{kn})^N \quad (4)$$

The sequence $t_{1n}, t_{2n}, \dots, t_{kn}$ is considered to be (f, p) order Co-integration, denoted as $t_n \sim CI(f, p)$, and a is the Co-integration vector. There are many specific technical models for testing the Co-integration relationship, such as the EG two-step method and the Gregeory method.

EG two-step method: in order to test whether $y_{1n}, y_{2n}, \dots, y_{kn}$ are co-integration, Engle and Granger proposed a two-step test method in 1978, which is also called EG test. First, if the k sequences are all 1st-order single integer sequences, use the OLS method to estimate the model $y_{1n} = b_1 + b_2 y_{2n} + \dots + b_k y_{kn} + u_n$, calculate the unbalanced error, and get

$$\hat{y}_{1n} = \hat{b}_1 + \hat{b}_2 y_{2n} + \dots + \hat{b}_k y_{kn} \quad (5)$$

$$H_0: c = 0 \quad (6)$$

Secondly, the test methods to test the unity of e_n are still DF and ADF tests. Since the intercept term is included in the Co-integration regression, model testing is used:

$$\Delta e_n = c e_{n-1} + \sum_{i=1}^p \theta_n \Delta e_{n-i} + u_n \quad (7)$$

When testing, reject the null hypothesis $H_0: c = 0$, which means that the error term e_n is a stationary series, thus indicating that $y_{1n}, y_{2n}, \dots, y_{kn}$ has an integral co-relationship. The purpose of Co-integration test is to determine whether there is a Co-integration relationship between linear combinations in a certain set of non-stationary time series. The Co-integration test can also determine whether the linear regression equation is set correctly. If the residual sequence is stable, it makes sense to adjust the regression equation, indicating that there is a long-term equilibrium relationship between the variables [25].

(3) Error correction model

According to the theory proposed by Engle and Granger (1987), if two variables are cointegrated, the short-term imbalance relationship between them can be represented by an error correction model. In order to describe the short-term relationship between bank structure and economic growth, an error correction model (ECM) can be established. Use Eviews software to establish equations for CR_4 , $LGDP$, and residual sequence u , and get:

$$D(CR_4) = 2.3426 + 1.7645 * U(-1) - 11.8458 * D(LGDP) + v_n \quad (8)$$

The short-term fluctuations of CR_4 can be divided into two parts: one is the impact of short-term fluctuations, and the other is the impact of deviations from long-term equilibrium. Granger causality

test can be performed on LGDP and CR4.

(4) Gran Causality Test

Granger causality test is to study whether the sequence x is the reason for the sequence y . First estimate the extent to which the current value of y can be explained by its own hysteresis value, and then verify whether adding the hysteresis value of X can improve the interpretation of y . If you add X delay value can improve the interpretation of Y , then X sequence can be thought of Granger cause X [26].

Two time series X and Y , the sample period is $n=1,2,\dots,N$. To test whether X is the Granger cause of Y , the following two models can be constructed:

Unrestricted regression:

$$Y_n = a_0 + \sum_{i=1}^m a_i Y_{n-i} + d_n \quad (9)$$

Regression with restrictions:

$$Y_n = a_0 + \sum_{i=1}^m a_i Y_{n-i} + \sum_{j=1}^k b_j X_{n-j} + d_n \quad (10)$$

If $b_j=0$ is true for all $j=1,2,\dots,k$, then X variable will not cause Y variable to occur, so the two do not constitute a causal relationship, and the lag period can be chosen arbitrarily. In this way, hypothesis $H_0: b_j=0, j=1,2,\dots,k$, can be set to regress (6) and (7) respectively to obtain the residual sum of squares RSS_1 and explain the squares ESS_1 and ESS_2 , and construct the following statistics:

$$F = \frac{(ESS_1 - ESS_2)/k}{RSS_1/N - (k+m-1)} \quad (11)$$

F obeys the distribution of the first degree of freedom as m and the second degree of freedom as $N - (k+m+1)$. At a given significance level α , there is a corresponding critical value F_{α} . If $F > F_{\alpha}$, then the $(1-\alpha)$ reject the null hypothesis at the confidence level. Then there is the reason why X is Granger of Y , otherwise. Accept the H_0 null hypothesis, and X is not the Granger cause of Y change [27].

(5) Impulse response

Co-integration analysis only provides information about the long-term relationship between variables, but does not provide more information about the dynamic characteristics of one variable acting on another variable. The introduction of impulse response function helps to solve this problem. The impulse response function describes the response of endogenous variables to the impact of error. Like the variable AR model, the VAR model can also be expressed as an infinite-order vector moving average model MA. Consider an unrestricted VAR (1) model without exogenous variables:

$$Y_n = \phi_1 Y_{n-1} + \varepsilon_n \quad (12)$$

$$Y_n = (I - \phi_1 L)^{-1} \varepsilon_n \quad (13)$$

$$Y_n = \varepsilon_n + \phi_1 \varepsilon_{n-1} + \phi_1^2 \varepsilon_{n-2} + \dots + \phi_1^k \varepsilon_{n-k} + \dots \quad (14)$$

The entire moving average parameter matrix is represented by \aleph_s :

$$Y_n = \varepsilon_n + \aleph_1 \varepsilon_{n-1} + \dots = d + \sum_{s=0}^{\infty} \aleph_s \varepsilon_{n-s} = d + \aleph(L) \varepsilon_n \quad (15)$$

In:

$$\aleph_1 = \phi_1, \aleph_2 = \phi_1^2, \dots, \aleph_s = \phi_1^s \quad (16)$$

Therefore, the matrix \aleph_s satisfies:

$$\mathbf{\kappa}_s = \frac{\delta Y_{n+s}}{\delta \varepsilon_n} \quad (17)$$

Among them, $\frac{\delta Y_{n+s}}{\delta \varepsilon_n}$ follows the derivation rule of vector function,

$$\frac{\delta Y_{n+s}}{\delta \varepsilon_n} = \frac{\delta y_{n+s}^{(i)}}{\delta \varepsilon_{jn}} \quad (18)$$

$y_{n+s}^{(i)}$ is the i-th component of Y_{n+s} , and ε_{jn} is the j-th component of ε_n . The element in the i-th row and j-th column of $\mathbf{\kappa}_s$ represents, when the error term of the j-th variable in period n is increased by one unit and the error terms in other periods are constant, the effect on the value of the i-th variable in period t+s. Therefore, $\frac{\delta y_{n+s}^{(i)}}{\delta \varepsilon_{jn}}$ is called the impulse response function.

If it is known that the increment of ε_n from the first to the nth component once is: $\varphi_1, \varphi_2, \dots, \varphi_k$, then the comprehensive influence of these increments on the vector Y_{n+s} is:

$$\Delta Y_{t+s} = \frac{\delta Y_{t+s}}{\delta \varepsilon_{1n}} \varphi_1 + \frac{\delta Y_{t+s}}{\delta \varepsilon_{2n}} \varphi_2 + \dots + \frac{\delta Y_{t+s}}{\delta \varepsilon_{kn}} \varphi_k = \mathbf{\kappa}_s \varphi \quad (19)$$

In

$$\varphi = (\varphi_1, \varphi_2, \dots, \varphi_k) \quad (20)$$

Assuming that the system is in a balanced state, if the balance is broken for some reason, the system will respond to interference, deviate from the balance, and then restore the balance. This process is described by the impulse response function. A VAR model was introduced, with LGDP, GM and XL as endogenous variables [28]. According to the AIC and BIC criteria, the response impulse analysis can be performed based on the VAR model, further study of mutual influence and the degree of interaction channels as well as economic growth and the scale and efficiency of the banking sector banking sector.

3. Experimental Results of the Development of Digital Transformation on the Dynamics of the Banking Financial and Economic Correlation Network

The commercial banks in this city did not set up a separate e-banking department at the beginning of their establishment, and did not focus on the development of e-banking related businesses. With the rapid development of e-commerce groups such as JD.com and Alibaba, they realize that customer' consumption thinking and behavior have undergone tremendous changes, and customers are increasingly inclined to electronic, diversified and convenient financial services. Therefore, commercial banks established an electronic banking department in 2010 and made a strategic decision to accelerate the construction of electronic banking. Figure 4 shows the development history of internet finance in city commercial banks. And in 2018, the commercial bank united We Chat and Alipay to launch a new payment channel-Alipay for offline merchants.

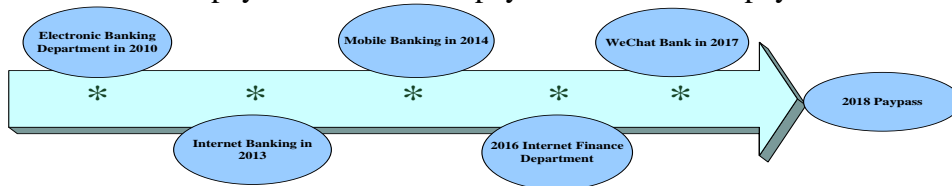


Figure 4: Development history of internet finance of city commercial banks

3.1 Overview of the Operation of Banks in This City

This article analyzes the operating conditions of commercial banks in this city from the three indicators of profitability, supervision and management, and risk management. The profitability ratio is used to measure the profitability of commercial banks, including return on capital, return on assets, and return on cost. As shown in Figure 5, from 2016 to 2019, the city's commercial banks' return on capital maintained a growing trend, with an average annual growth rate of 22.4%. From 2016 to 2018, the rate of return on capital has increased rapidly, indicating that each unit of capital brings a higher net profit. After 18 years, the profit rate of capital has declined slightly, indicating that the return rate of each unit of capital to shareholders has decreased, reflecting the decline in their capital utilization ability and financial management ability. It is not difficult to see from the figure that the profit margin of commercial banks has gradually decreased, and the rate of decline has accelerated in 2018, which reflects that the profit per unit asset of commercial banks in this city is declining. The scale of bank assets keeps growing while the rate of return on assets is declining year by year, reflecting the inefficiency of banks in using liabilities to create profits. The cost-to-income ratio refers to the cost that the bank needs to pay for each unit of income, and is used to measure the bank's income efficiency. The graph shows that the cost-to-income ratio of commercial banks is decreasing. Since 2016, the business coverage of commercial banks in this city has expanded rapidly and the number of personnel has continued to increase, resulting in continuous growth of staff costs and other administrative expenses. However, the growth rate of net interest income is faster than expenses, which has gradually reduced the cost-to-income ratio of the commercial banks. Based on various profitability indicators, the profit acquisition ability, capital operation ability and financial management of commercial banks in this city will be reduced after 18 years [29].

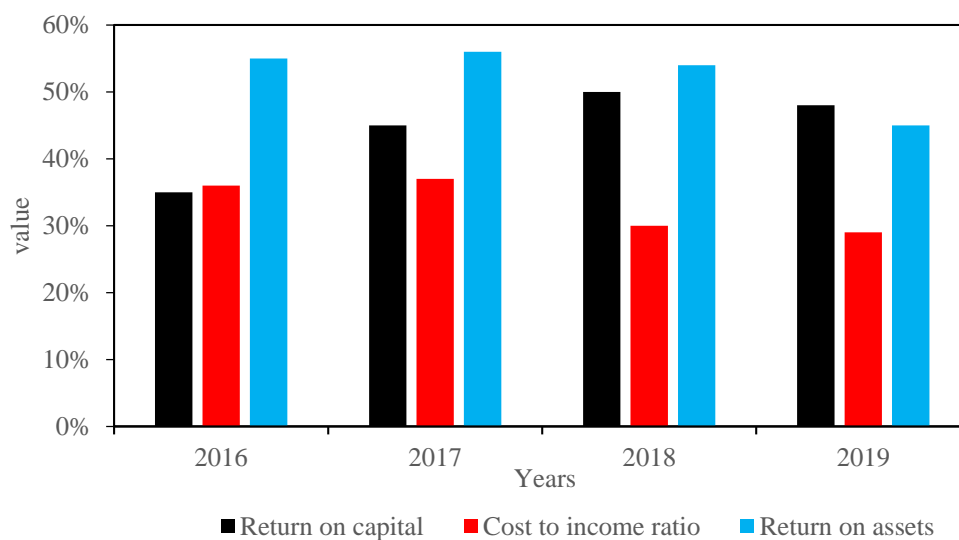


Figure 5: Changes in profitability index of 2016-2019

Regulatory indicators are statutory indicators that commercial banks must comply with, formulated by the regulatory agencies of the China Banking Regulatory Commission. They mainly include capital adequacy ratio, reserve coverage ratio, and loan-to-deposit ratio. As shown in Figure 6 (left), the value of each index of the commercial bank is within the legal range, but after 18 years, the value of each index is close to the boundary of the legal value, so its operating risk is slightly higher.

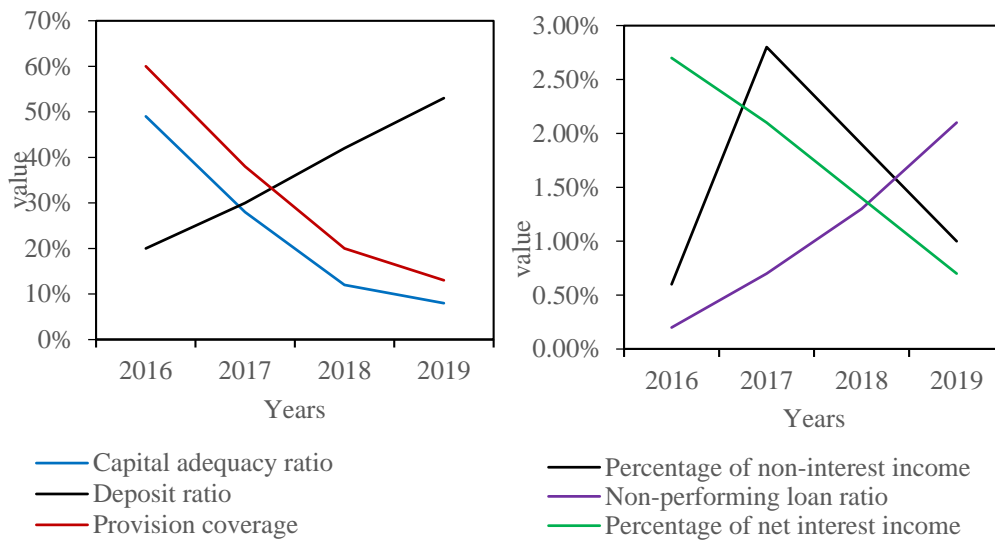


Figure 6: Changes in supervision and management and risk management indicators in 2016-2019

Risk management indicators reflect the risk management capabilities of commercial banks, including indicators such as net interest income ratio, non-interest income ratio, and non-performing loan ratio. It is not difficult to see from Figure 6 (right) that the proportion of net interest income has been declining and has entered a rapid decline range after 2018. The proportion of non-interest income rose rapidly from 2016 to 2017, and then fell sharply. Based on the two indicators, the commercial bank has been adjusting the revenue share of various businesses, hoping to gradually weaken its dependence on the traditional interest income model by optimizing the revenue structure. However, due to the limitations of the city commercial banks' own defects, the effect is not obvious. It can be seen from the non-interest income ratio that the city's commercial banks have weaker risk resistance capabilities. Since 2017, the non-performing loan ratio of commercial banks has maintained rapid growth, with an average annual growth rate of 193.4%. Due to the rapid growth of the non-performing loan ratio, commercial banks need to increase the non-performing loan reserve ratio and the total loan reserve ratio, which has also caused the asset profit ratio to decline year by year.

3.2 Status Quo of the Development of Electronic Banking Business in Commercial Banks

(1) The types of e-banking services continue to increase, and transfer services are used most frequently

With the diversification of the types of electronic banking services of commercial banks and the optimization of product operation procedures, it has become more convenient for users to use electronic banking to handle financial and non-financial businesses. The monthly report data of the electronic banking of commercial banks in this city shows that the utilization rate of transfer business is the highest in the electronic channel business. Users use online banking to mainly handle transfer services (business use frequency is 89.9%), bank-enterprise account balance business (business use frequency is 8.8%), and bank-enterprise account reconciliation account signing and cancellation services (business use frequency is 1.2%). It can be seen from Figure 7 and Figure 8 that in the transfer business, the frequency of use of inter-bank transfers is the highest at 60.2%, and intra-bank transfers take the second place at 29.6%. Personal customers and small and micro merchants use personal online banking to mainly handle transfer services (the frequency of business use is 99%) and payment services (the frequency of business use is 0.7%). Personal online banking transfer services include intra-bank transfers, intra-bank batch transfers, inter-bank batch

transfers, online banking interconnected inter-bank transfers, inter-bank batch transfers, online banking interconnected transfers, and inter-bank transfers. Among them, the highest utilization rate of inter-bank transfer business was 46%, followed by intra-bank transfer at 29.1%, and online banking and internet transfers accounted for less than 1%.

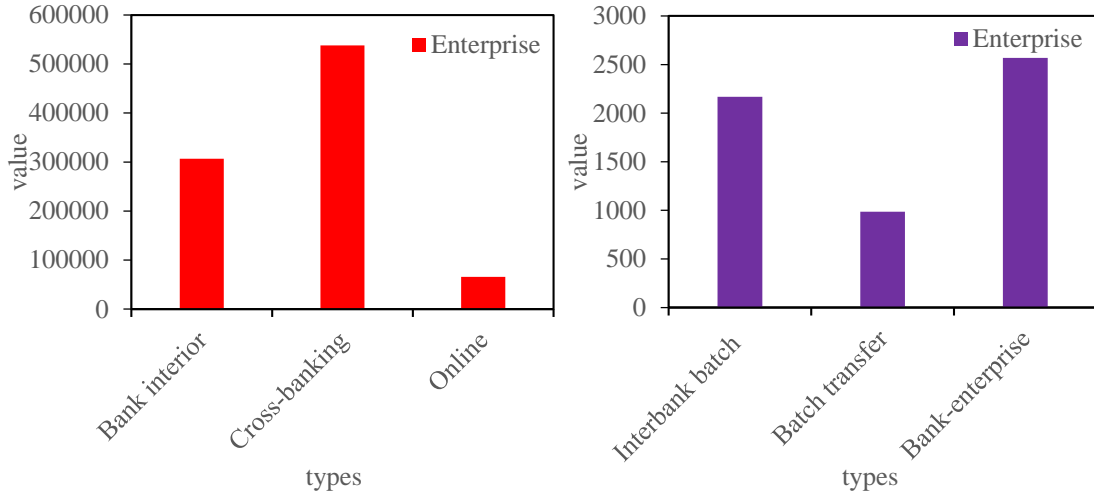


Figure 7: 2019 Enterprises online banking transfers business transactions

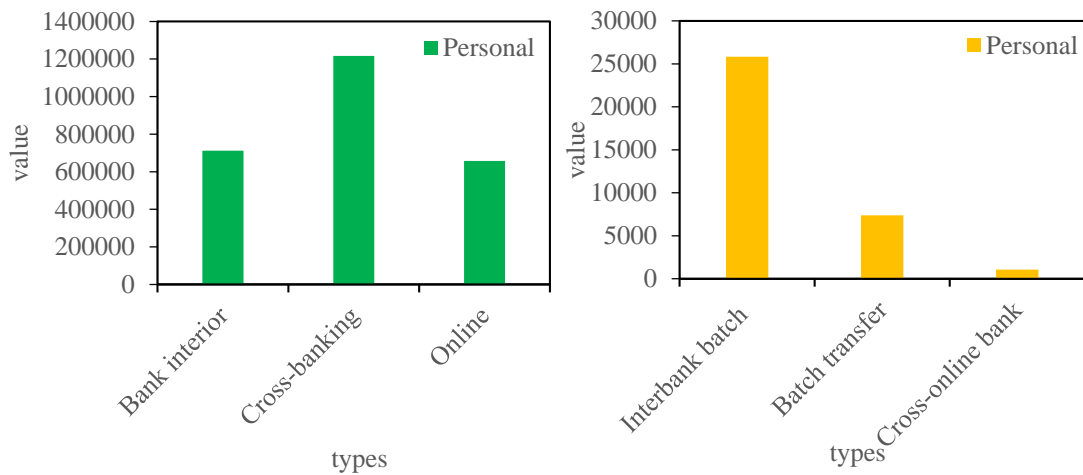


Figure 8: 2019 Personal online banking transfers business transactions

As shown in Table 1, users who use mobile banking mainly handle transfer services, agent payment services, and make appointment application withdrawal services, accounting for 98.92%, 0.28%, and 0.21%, respectively. Among them, the utilization rate of inter-bank transfer business accounted for the highest percentage of 65.01%.

Table 1: In 2019, mobile banking business transactions

Business type	Number of transactions	Business type	Number of transactions
Intra bank transfer	202301	Interbank transfer	648132
Internet Banking Interconnection	149284	Pay	2521
Current to current	1299	Appointment withdrawal application	2213
Current transfer	1278	Account loss	171

(2) The amount of personal online banking transactions is gradually decreasing, and the amount of mobile banking transactions is increasing rapidly

As shown in Figure 9, the number of online banking users and mobile banking users of commercial banks in the city has increased year by year, but the growth rate is gradually slowing down, with an average annual growth rate of 49.9%, 62.1%, and 170.1%. From this, it can be seen that the scale of personal banking transactions of commercial banks has gradually declined after 2017, while the scale of mobile banking transactions has grown rapidly after 2018. As shown in Figure 10, in 2019, it increased by 140.1% year-on-year, with an average annual growth rate of 121.1%. Different from the first decline and then increase in the scale of mobile banking transactions, the number of mobile banking transactions has maintained a rapid growth. In 2017, the number of mobile banking transactions of commercial banks was 131,000, and by 2019 it has grown to 1.001 million. The average growth rate was 720.1%.

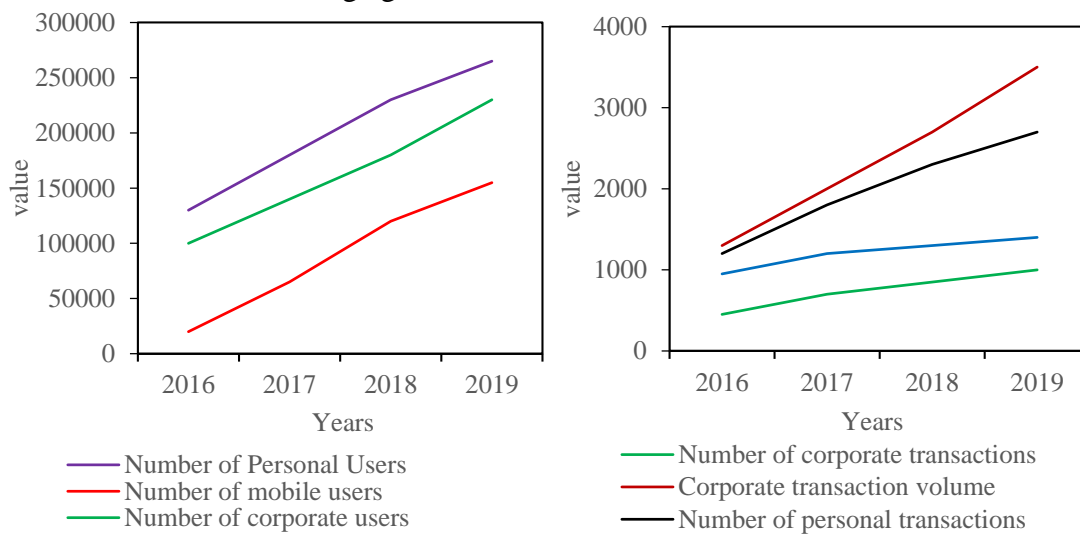


Figure 9: 2016-2019 personal and business banking network usage

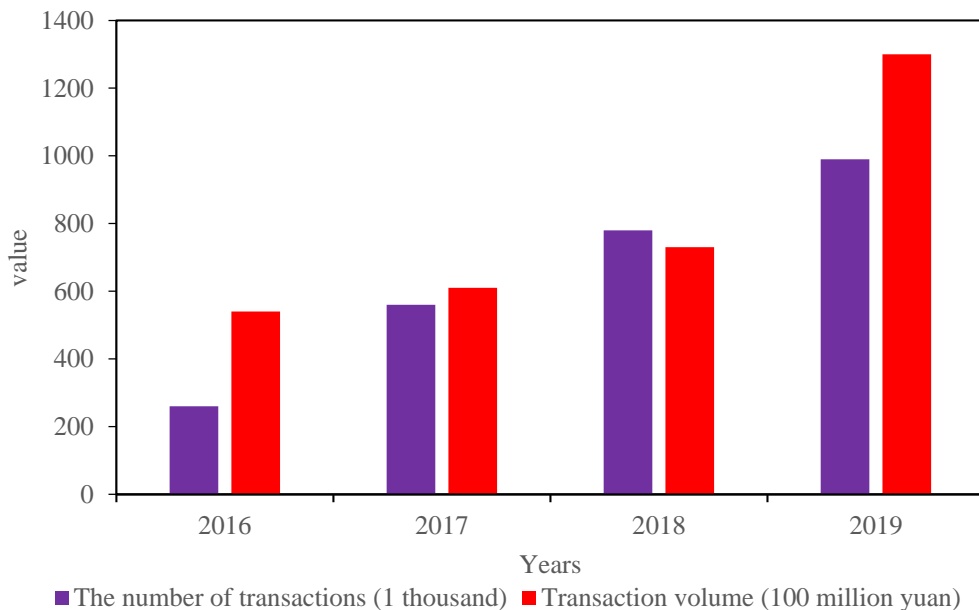


Figure 10: Mobile banking trading in this municipal commercial bank 2016-2019

The online banking services of commercial banks in this city are mainly aimed at corporate users, and there are two main types of corporate customers. One of them has the demand for online payment. The users of this type are mainly large companies (such as building materials companies, airlines, steel companies, etc.), and their unit transactions are relatively large, and the payment scenarios are mainly transfers; the other is mainly small offline physical merchants. With the increase in mobile network usage of mobile terminals, the business needs of this kind of customers are gradually shifting to offline, and their demand for mobile payments is getting higher and higher. The needs of this type of customers are more consistent with the needs of individual customers. Online banking uses online channels to perform fund payment and clearing services on the PC client. When making online payments on the PC side, various plug-ins need to be installed, which is complicated and cumbersome. In contrast, the operation of mobile banking is simple and convenient. Customers only need to install the mobile app of the commercial bank to complete dynamic capital services and living expenses payment services. Therefore, some online banking customers have begun to use mobile banking instead of online banking to handle part of the business. Commercial banks restricted the daily fund transfer limit (50,000 yuan) of mobile banking customers, resulting in their inability to meet the flow needs of large corporate users. This is also why the transaction scale of corporate online banking has continued to rise steadily, while the transaction scale of personal online banking has shown a downward trend.

3.3 Dilemma of Commercial Banks' Internet Financial Transformation

(1) The off-counter replacement rate is low, and the product homogeneity is serious

As shown in Table 2, the replacement rate of banks in this city has generally maintained a growth trend. As of the end of 2019, the rate of bank withdrawals reached 71.6%, an average annual increase of 5.2%. According to statistics, at the end of 2018, the off-counter replacement rate of state-owned commercial banks averaged 97%, while the off-counter business rate of 12 listed banks was also as high as 98%, and the off-counter replacement rate of Min sheng Bank was as high as 99.3%. In addition, the average off-counter replacement rate of the four city commercial banks equivalent to the size of the city's banks also reached 85%. It is not difficult to see from the table, the off-counter replacement rate of banks in this city is far from that of listed banks, and there is also a certain gap in the off-counter replacement rate compared with banks of the same size.

Table 2: Changes in replacement rate from the cabinet

	Year 2016	Year 2017	Year 2018	Year 2019
City Bank	59.98%	62.43%	61.98	70.11%
Five state-owned banks	95.86%	96.46%	98.68%	99.21%
Four city banks	79.24%	80.68%	80.26%	84.21%

There is a big gap in the types of products and application scenarios of the electronic banking of commercial banks in this city. According to the design process of its electronic channels, the mobile banking of the city's commercial banks mainly provides customers with three types of services: appointment inquiry, agent payment and transfer, and its business functions are mainly inquiries. Online banking mainly provides customers with three types of services: account information inquiry, bill pooling and transfer. As shown in Table 3, (among them, 1 represents the business function that can be realized, and 0 represents the business function that has not yet been realized), large banks such as China Merchants Bank and China Ever bright Bank, in addition to the above-mentioned business functions, have also increased the types of e-banking services, realizing the two-way expansion of e-banking business horizontally and vertically. Customers of China Merchants Bank can apply for bank cards and loans through We Chat Bank, can purchase foreign exchange or conduct foreign exchange settlements on We Chat Bank, and can also handle "Chao Chaoying"

business. Based on the GPS function of mobile phones, ever bright Bank provides card less withdrawal services for customers on We Chat channels. Bank A has fewer types of electronic banking services, more basic business functions, and a higher degree of product homogeneity [30].

Table 3: Commercial banks, Bank of Communications, China Merchants Bank Mobile Banking Service Comparison

	City Commercial Bank We Chat Bank	Bank of Communications We Chat Bank	China Merchants Bank We Chat Bank
Inquire	1	1	1
Customer service	0	1	1
Apply for a card	0	1	1
Financial management	0	1	1
Other features	No card withdrawal	Card less withdrawal, mobile phone recharge	Online loan

(2) Electronic banking functions are lacking and cannot meet customer needs

The research and development and process design of electronic channel products should take the customer's transaction and consumption needs as the starting point, and expand the boundary of financial services from the perspective of customer consumption propensity. This kind of product and service model dominated by customer consumption and investment and financing needs, and the electronic channel business developed by this will be more in line with customer needs, and the effect of innovation will be higher. It is not difficult to see from Table 4 that the convenience and speed of online banking operations is the primary reason why customers choose to use online banking. In the case of convenient business operations, if a bank can use cutting-edge Internet technology to ensure the security of online banking operations, and at the same time it has a more professional service team and a high brand reputation, then the bank's online banking will attract a large number of customers, and the bank can achieve its purpose of increasing the scale of customers through online banking. Table 4 shows that when customers use online banking, the stability and security of the system becomes their primary consideration. Customers want to be able to handle business quickly, simply and accurately in a stable system. Secondly, customers want to be able to enjoy a variety of services at a lower cost. Although the online banking system of banks in this city is relatively stable, runs fast, and has a simple and clear business interface, there are too many business operations steps. In order to enhance the stickiness of electronic channel customers, bank exempts its online banking customers from account opening fees and transfer and remittance fees. However, the business functions it can achieve are relatively basic and do not match the changing payment requirements of customers.

Table 4: Customer use of online banking reasons and key attention

Reason	Informative	Powerful	Good brand	Good service	Good reputation	Safe and reliable	Convenient
Proportion of people	4%	9%	9%	14%	16%	18%	30%
Focus on factors	Fees high and low	Efficient	Timeliness	Operating speed	Run smoothly	Simple operation	System security
Proportion of people	8%	7%	6%	11%	14%	20%	34%

Different from online banking, customers who use mobile banking are more concerned about the stability and security of the mobile banking system. But mobile banking customers also hope that the system can be handled quickly and easily when the system is safe and stable, as shown in Figure

11.

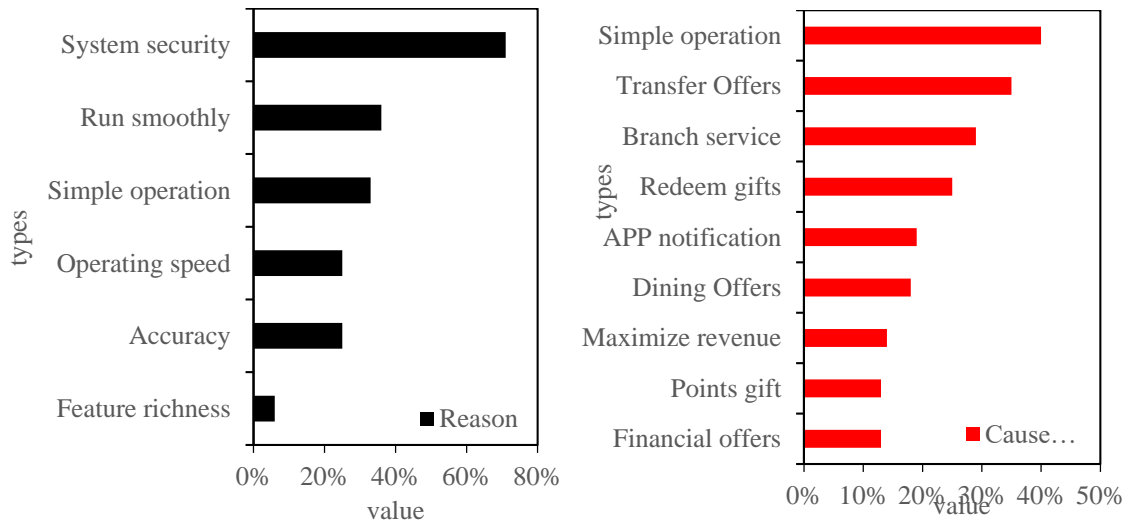


Figure 11: Customer use of mobile banking reasons

It can be seen from the figure that the simple login method of mobile banking is the most important factor in urging customers to use mobile banking. Commercial bank customers must log in from the PC terminal to use online banking, and must be equipped with corresponding electronic certificates on the computer. And to use mobile banking, you only need to download the mobile client on the mobile channel, and the mobile terminal only needs the login name and password to log in. Compared with online banking of commercial banks, its mobile banking greatly simplifies the business processing process, which is also the reason for the rapid increase in the number and scale of mobile banking transactions. It is not difficult to find from the picture that customers not only want to be able to handle business at a lower cost, but also want to enjoy a variety of benefits in mobile banking. For example, redeem points for gifts, shopping and dining discounts.

4. Discuss

In summary, under the current situation, our country's commercial banks must actively use digital technology to carry out digital transformation in order to improve their operating efficiency. The so-called digital transformation refers to the use of digital technology to change the way companies create value for customers. Today, digital technologies are being integrated into products, services, and processes to change customer business outcomes and provide commercial and public services. It usually brings a better user experience to customers and usually requires the active participation of customers. The digital transformation of the traditional banking industry mainly uses digital emerging technologies such as big data, artificial intelligence, block chain, and cloud computing to realize the transformation of business models and operating models.

The future has come, and existing banks have started to pioneer digital reforms and innovations. China Construction Bank officially opened the first unmanned bank in Shanghai. There is no cashier at this branch. Instead, face recognition doors, robots, smart teller machines, etc. are used. More than 90% of cash and non-cash business can be processed. For complex ones, you only need to bring earphones and glasses and operate one-to-one remote control. This "unmanned bank" is not only a bank, but also covers many life scenarios. This is a "library" with 50,000 books. The book can be taken away by scanning the phone; it is also a "game room" using AR and VR technology. Sit down and you can see all the rental houses of CCB Jianrong Home, which is also a "small supermarket". After you apply for relevant financial services, you can pick up free drinks at the

smart vending machine, and the robot will automatically take pictures. The launch of "Unmanned Bank" fully demonstrated the use of the latest scientific and technological financial intelligence achievements such as biometric recognition, voice recognition, and data mining by CCB. And integrate the current popular robot, VR, AR, face recognition, voice navigation and other element technologies to carry out the digital transformation of intelligent networks.

There is no doubt that cloud computing, big data, artificial intelligence and block chain will reshape the infrastructure of the next generation of finance. Some people call it the Internet of Value. Corresponding to the industrial society of the past, the financial system has established a pyramid-shaped, hierarchical, standardized, and procedural financial structure. Now that it has entered the information society, the financial system needs to establish financial results such as shared finance, shared econoour, distributed and networked financial results, and there is a trend of decentralization. Therefore, digital technology will deeply influence and transform every financial process. With the development of digital technology, the banking industry will undergo digital transformation and gradually enter Digital Bank 4.0.

5. Conclusions

The traditional banking model can no longer meet everyone's needs in life. The times are advancing, society is changing, and the development of digital technology has profoundly affected our country's large and medium-sized commercial banks. In order to improve operating performance, our country's large and medium-sized commercial banks need to carry out digital transformation and use emerging digital advanced technologies to improve service levels. In terms of specific operations, the banking industry should abandon the original old business philosophy, actively change the business philosophy, actively adapt to the business strategy, pay attention to customer experience, and provide better customer service. In terms of internal organizational structure, actively promote organizational changes, create a flexible work model, mobilize the enthusiasm of existing employees, attract outstanding talents, break the existing organizational structure, and create a collaborative work model. In addition, commercial banks should actively cooperate with financial technology companies and actively introduce financial technology. Organize a special team to learn and apply financial technology such as big data, cloud computing, artificial intelligence, and block chain, keep up with the development of financial technology, actively apply. Innovate financial service models and products, and provide customers with high-quality financial services. At the same time, regulatory agencies should also strengthen fiscal supervision and avoid systemic risks. However, due to the limitations of time and technology, this paper did not analyze and discuss the problems in the digital transformation of banks in detail, which we will further analyze in the future.

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